

In the Claims

1       1. (Original) A method of adaptively controlling sensitivity, on a pixel-by-pixel basis, of  
2 a digital imager, comprising:

3             (a) determining a number of pixels of image data having illumination intensity levels  
4 within a first defined range of illumination intensity levels;

5             (b) determining an illumination intensity level mapping function based upon the  
6 determined number of pixels within the first defined range of illumination intensity levels;

7             (c) determining a transfer control function based on the determined illumination intensity  
8 level mapping function; and

9             (d) imposing the determined transfer control function upon a pixel of the digital imager.

1       2. (Original) The method as claimed in claim 1, further comprising:

2             (e) determining a number of pixels having illumination intensity levels within a second  
3 defined range of illumination intensity levels; and

4             (f) determining an integration time based upon the determined number of pixels having  
5 illumination intensity levels within a second defined range of illumination intensity levels;

6             said determination of the transfer control function being determined based on the  
7 determined illumination intensity level mapping function and the determined integration time.

1       3. (Original) The method as claimed in claim 1, wherein (a) – (d) are repeated until a  
2 desired dynamic range is realized.

1       4. (Original) The method as claimed in claim 1, wherein the first defined range of  
2 illumination intensity levels is a range of illumination intensity levels including an illumination  
3 intensity level representing pixel saturation.

1       5. (Original) The method as claimed in claim 2, wherein the second defined range of  
2 illumination intensity levels is a range of illumination intensity levels including an illumination  
3 intensity level representing a minimum illumination intensity level.

1       6. (Original) The method as claimed in claim 2, wherein the first defined range of  
2 illumination intensity levels is a range of illumination intensity levels including an illumination  
3 intensity level representing pixel saturation and the second defined range of illumination  
4 intensity levels is a range of illumination intensity levels including an illumination intensity level  
5 representing a minimum illumination intensity level adjusted for a pixel offset value.

1       7. (Original) The method as claimed in claim 1, wherein said determination of a number  
2 of pixels of image data having illumination intensity levels within a first defined range of  
3 illumination intensity levels determines a number of pixels of image data having illumination  
4 intensity levels within a first defined range of illumination intensity levels from a frame of pixels  
5 of image data created by the digital imager.

1       8. (Original) The method as claimed in claim 1, wherein said determination of a number  
2 of pixels of image data having illumination intensity levels within a first defined range of  
3 illumination intensity levels determines a number of pixels of image data having illumination  
4 intensity levels within a first defined range of illumination intensity levels from a partial frame of  
5 pixels of image data created by the digital imager.

1       9. (Original) The method as claimed in claim 1, wherein said determination of a number  
2 of pixels of image data having illumination intensity levels within a first defined range of  
3 illumination intensity levels determines a number of pixels of image data having illumination  
4 intensity levels within a first defined range of illumination intensity levels from a defined area  
5 within a frame of pixels of image data created by the digital imager.

1       10. (Original) The method as claimed in claim 1, wherein said determination of a number  
2 of pixels of image data having illumination intensity levels within a first defined range of  
3 illumination intensity levels determines a number of pixels of image data having illumination  
4 intensity levels within a first defined range of illumination intensity levels from a user-defined  
5 area within a frame of pixels of image data created by the digital imager.

1        11. (Original) The method as claimed in claim 1, wherein the determined illumination  
2 intensity level mapping function is a calculated illumination intensity level mapping function, the  
3 calculation being based upon the determined number of pixels within the first defined range of  
4 illumination intensity levels.

1        12. (Original) The method as claimed in claim 1, wherein the determined illumination  
2 intensity level mapping function is a selected illumination intensity level mapping function  
3 selected from a plurality of pre-specified illumination intensity level mapping functions, the  
4 selection being based upon the determined number of pixels within the first defined range of  
5 illumination intensity levels.

1        13. (Original) The method as claimed in claim 1, wherein the determined transfer control  
2 function is a calculated transfer control function, the calculation being based upon the  
3 determined illumination intensity level mapping function.

1        14. (Original) The method as claimed in claim 1, wherein the determined transfer control  
2 function is a selected transfer control function from a plurality of pre-specified transfer control  
3 functions, the selection being based upon the determined illumination intensity level mapping  
4 function.

1        15. (Original) The method as claimed in claim 2, wherein the determined transfer control  
2 function is a calculated transfer control function, the calculation being based upon the  
3 determined illumination intensity level mapping function and determined integration time.

1        16. (Original) The method as claimed in claim 2, wherein the determined transfer control  
2 function is a selected transfer control function from a plurality of pre-specified transfer control  
3 functions, the selection being based upon the determined illumination intensity level mapping  
4 function and determined integration time.

1        17. (Currently Amended) A method of adaptively controlling sensitivity, on a pixel-by-  
2 pixel basis, of a digital imager, comprising:

3       (a) determining a number of pixels of image data having illumination intensity levels  
4       within a first defined range of illumination intensity levels;

5       (b) determining an illumination intensity level mapping function based upon the  
6       determined number of pixels within the first defined range of illumination intensity levels;

7       (c) determining a transfer control function based on the determined illumination intensity  
8       level mapping function; and

9       (d) imposing the determined transfer control function upon a pixel of the digital imager;  
10      The method as claimed in claim 1, wherein

11       said determination of a number of pixels of image data having illumination intensity  
12       levels within a first defined range of illumination intensity levels determines a number of pixels  
13       of image data having illumination intensity levels within a first defined range of illumination  
14       intensity levels during a period of time that the digital imager is creating a second frame of  
15       pixels;

16       said determination of an illumination intensity level mapping function determines an  
17       illumination intensity level mapping function based upon the determined number of pixels of  
18       image data having illumination intensity levels within a first defined range of illumination  
19       intensity levels during the period of time that the digital imager is creating the second frame of  
20       pixels; and

21       said imposition of the determined transfer control function imposes the determined  
22       transfer control function upon a pixel of the digital imager during a third frame of pixels of  
23       image data being created by the digital imager.

1       18. (Currently Amended) A method of adaptively controlling sensitivity, on a pixel-by-  
2       pixel basis, of a digital imager, comprising:

3       (a) determining a number of pixels of image data having illumination intensity levels  
4       within a first defined range of illumination intensity levels;

5       (b) determining an illumination intensity level mapping function based upon the  
6       determined number of pixels within the first defined range of illumination intensity levels;

7       (c) determining a transfer control function based on the determined illumination intensity  
8       level mapping function; and

9           (d) imposing the determined transfer control function upon a pixel of the digital imager;

10       The method as claimed in claim 1, wherein

11           said determination of a number of pixels of image data having illumination intensity  
12       levels within a first defined range of illumination intensity levels determines a number of pixels  
13       of image data having illumination intensity levels within a first defined range of illumination  
14       intensity levels during a period of time that the digital imager is creating a first frame of pixels;

15           said determination of an illumination intensity level mapping function determines an  
16       illumination intensity level mapping function based upon the determined number of pixels of  
17       image data having intensity levels within a first defined range of intensity levels during the  
18       period of time that the digital imager is creating the first frame of pixels; and

19           said imposition of the determined transfer control function imposes the determined  
20       transfer control function upon a pixel of the digital imager during a second frame of pixels of  
21       image data being created by the digital imager.

1           19. (Original) The method as claimed in claim 2, wherein the illumination intensity level  
2       mapping function is determined independently of the determination of the integration time.

1           20. (Original) The method as claimed in claim 2, wherein the determinations of the  
2       illumination intensity level mapping function and integration time are dependent thereupon.

1           21. (Original) The method as claimed in claim 2, wherein the illumination intensity level  
2       mapping function is determined prior to the determination of the integration time.

1           22. (Original) The method as claimed in claim 2, wherein the illumination intensity level  
2       mapping function is determined after the determination of the integration time.

1           23. (Original) The method as claimed in claim 2, wherein determinations of the  
2       illumination intensity level mapping function and the integration time are determined  
3       substantially simultaneously.

1        24. (Original) The method as claimed in claim 12, wherein the number of illumination  
2 intensity level mapping functions to select from is eight.

1        25. (Original) The method as claimed in claim 1, further comprising:

2            (d) determining, for each of a plurality of defined ranges of illumination intensity levels,  
3 a number of pixels within the defined range of illumination intensity levels when the determined  
4 number of pixels within the first defined range of illumination intensity levels is above a first  
5 threshold; and

6            (e) determining, for each defined range of illumination intensity levels, an illumination  
7 intensity level mapping function based upon the determined number of pixels within the defined  
8 ranges of illumination intensity levels.

1        26. (Original) A method of adaptively controlling sensitivity, on a pixel-by-pixel basis, of  
2 a digital imager, comprising:

3            (a) determining a plurality of numbers of pixels, each determined number of pixels being  
4 a number of pixels within an associated defined range of illumination intensity levels;

5            (b) determining a plurality of illumination intensity level mapping functions, each  
6 determined illumination intensity level mapping function corresponding to one defined range of  
7 illumination intensity levels, each illumination intensity level mapping function being  
8 determined based upon the determined number of pixels within an associated defined range of  
9 illumination intensity levels;

10          (c) determining a transfer control function based on the plurality of determined  
11 illumination intensity level mapping functions; and

12          (d) imposing the determined transfer control function upon a pixel of the digital imager.

1        27. (Original) The method as claimed in claim 26, further comprising:

2            (e) determining a number of pixels having illumination intensity levels within a specified  
3 range of illumination intensity levels; and

4            (f) determining an integration time based upon the determined number of pixels having  
5 illumination intensity levels within a specified range of illumination intensity levels;

6        said determination of the transfer control function being determined based on the  
7        plurality of determined illumination intensity level mapping functions and the determined  
8        integration time.

1            28. (Original) The method as claimed in claim 26, wherein (a) – (d) are repeated until a  
2        desired dynamic range is realized.

1            29. (Original) The method as claimed in claim 27, wherein the specified range of  
2        illumination intensity levels is a range of illumination intensity levels including an illumination  
3        intensity level representing a minimum illumination intensity level.

1            30. (Original) The method as claimed in claim 27, wherein the specified range of  
2        illumination intensity levels is a range of illumination intensity levels including an illumination  
3        intensity level representing a minimum illumination intensity level adjusted for a pixel offset  
4        value.

1            31. (Original) The method as claimed in claim 26, wherein said determination of a  
2        plurality of numbers of pixels determines each number of pixels corresponding to one defined  
3        range of illumination intensity levels from a frame of pixels of image data created by the digital  
4        imager.

1            32. (Original) The method as claimed in claim 26, wherein said determination of a  
2        plurality of numbers of pixels determines each number of pixels corresponding to one defined  
3        range of illumination intensity levels from a partial frame of pixels of image data created by the  
4        digital imager.

1            33. (Original) The method as claimed in claim 26, wherein said determination of a  
2        plurality of numbers of pixels determines each number of pixels corresponding to one defined  
3        range of illumination intensity levels from a defined area within a frame of pixels of image data  
4        created by the digital imager.

1       34. (Original) The method as claimed in claim 26, wherein said determination of a  
2 plurality of numbers of pixels determines each number of pixels corresponding to one defined  
3 range of illumination intensity levels from a user-defined area within a frame of pixels of image  
4 data created by the digital imager.

1       35. (Currently Amended) A method of adaptively controlling sensitivity, on a pixel-by-  
2 pixel basis, of a digital imager, comprising:

3           (a) determining a plurality of numbers of pixels, each determined number of pixels being  
4 a number of pixels within an associated defined range of illumination intensity levels;

5           (b) determining a plurality of illumination intensity level mapping functions, each  
6 determined illumination intensity level mapping function corresponding to one defined range of  
7 illumination intensity levels, each illumination intensity level mapping function being  
8 determined based upon the determined number of pixels within an associated defined range of  
9 illumination intensity levels;

10          (c) determining a transfer control function based on the plurality of determined  
11 illumination intensity level mapping functions; and

12          (d) imposing the determined transfer control function upon a pixel of the digital imager;  
13 The method as claimed in claim 26, wherein

14           said determination of a plurality of numbers of pixels determines each number of pixels  
15 corresponding to one defined range of illumination intensity levels during a period of time that  
16 the digital imager is creating a second frame of pixels;

17           said determination of a plurality of illumination intensity level mapping function  
18 determining each illumination intensity level mapping function corresponding to one of the  
19 defined ranges of illumination intensity levels during the period of time that the digital imager is  
20 creating the second frame of pixels; and

21           said imposition of the determined transfer control function imposes the determined  
22 transfer control function upon a pixel of the digital imager during a third frame of pixels of  
23 image data created by the digital imager.

1       36. (Currently Amended) A method of adaptively controlling sensitivity, on a pixel-by-  
2 pixel basis, of a digital imager, comprising:

3       (a) determining a plurality of numbers of pixels, each determined number of pixels being  
4       a number of pixels within an associated defined range of illumination intensity levels;

5       (b) determining a plurality of illumination intensity level mapping functions, each  
6       determined illumination intensity level mapping function corresponding to one defined range of  
7       illumination intensity levels, each illumination intensity level mapping function being  
8       determined based upon the determined number of pixels within an associated defined range of  
9       illumination intensity levels;

10      (c) determining a transfer control function based on the plurality of determined  
11      illumination intensity level mapping functions; and

12      (d) imposing the determined transfer control function upon a pixel of the digital imager;  
13      The method as claimed in claim 26, wherein

14       said determination of a plurality of numbers of pixels determines each number of pixels  
15       corresponding to one defined range of illumination intensity levels during a period of time that  
16       the digital imager is creating a first frame of pixels;

17       said determination of a plurality of illumination intensity level mapping function  
18       determining each illumination intensity level mapping function corresponding to one of the  
19       defined ranges of illumination intensity levels during the period of time that the digital imager is  
20       creating the first frame of pixels; and

21       said imposition of the determined transfer control function imposes the determined  
22       transfer control function upon a pixel of the digital imager during a second frame of pixels of  
23       image data created by the digital imager.

1       37. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-  
2       pixel basis, of a digital imager, comprising:

3       (a) determining a number of saturated pixels;

4       (b) selecting a first illumination intensity level mapping function when the determined  
5       number of saturated pixels is above a first threshold;

6       (c) determining a number of pixels having illumination intensity levels within a defined  
7       range of values;

8       (d) selecting a second illumination intensity level mapping function when the determined  
9       number of pixels is below a second threshold;

10           (e) determining a transfer control function based on the selected illumination intensity  
11 level mapping function; and  
12           (f) imposing the determined transfer control function upon a pixel of the digital imager.

1           38. (Previously Presented) The method as claimed in claim 37, wherein the first  
2 illumination intensity level mapping function represents a greater compression of the resolution  
3 of the high illumination intensity levels of the scene than the second illumination intensity level  
4 mapping function.

1           39. (Previously Presented) The method as claimed in claim 37, wherein said  
2 determination of the number of pixels having illumination intensity levels within a defined range  
3 of values determines the number of pixels when the determined number of saturated pixels is  
4 below a first threshold.

1           40. (Previously Presented) The method as claimed in claim 37, further comprising:  
2           (g) determining a number of pixels having illumination intensity levels within a specified  
3 range of illumination intensity levels; and  
4           (h) determining an integration time based upon the determined number of pixels having  
5 illumination intensity levels within a specified range of illumination intensity levels;  
6           said determination of the transfer control function being determined based on the selected  
7 illumination intensity level mapping function and the determined integration time.

1           41. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-  
2 pixel basis, of a digital imager, comprising:  
3           (a) determining a number of pixels of image data having illumination intensity levels  
4 within a first defined range of illumination intensity levels, the first defined range of illumination  
5 intensity levels including an illumination intensity level corresponding to a pixel saturation  
6 value;  
7           (b) determining an illumination intensity level mapping function based upon the  
8 determined number of pixels within the first defined range of illumination intensity levels;

9           (c) determining a number of pixels having illumination intensity levels within a second  
10 defined range of illumination intensity levels, the second defined range of illumination intensity  
11 levels including an illumination intensity level corresponding to a minimum illumination  
12 intensity level;

13           (d) determining an integration time based upon the determined number of pixels having  
14 illumination intensity levels within the second defined range of illumination intensity levels;

15           (e) determining a transfer control function based on the determined illumination intensity  
16 level mapping function and the determined integration time; and

17           (f) imposing the determined transfer control function upon a pixel of the digital imager.

1           42. (Previously Presented) The method as claimed in claim 41, wherein the transfer  
2 control function comprises a plurality of discrete transfer control functions.

1           43. (Previously Presented) The method as claimed in claim 41, wherein the transfer  
2 control function comprises eight discrete transfer control functions.

1           44. (Previously Presented) The method as claimed in claim 43, wherein the determined  
2 illumination intensity level mapping function comprises a plurality of discrete illumination  
3 intensity level mapping functions.

1           45. (Previously Presented) The method as claimed in claim 43, wherein the determined  
2 illumination intensity level mapping function comprises eight discrete illumination intensity  
3 level mapping functions.

1           46. (Withdrawn) The method as claimed in claim 44, wherein each discrete transfer  
2 control function is determined based on one of the plurality of distinct illumination intensity  
3 level mapping functions.

1           47. (Previously Presented) The method as claimed in claim 45, wherein each discrete  
2 transfer control function is determined based on one of the eight distinct illumination intensity  
3 level mapping functions.

1        48. (Previously Presented) The method as claimed in claim 44, wherein each discrete  
2        illumination intensity level mapping function is a linear illumination intensity level mapping  
3        function.

1        49. (Previously Presented) The method as claimed in claim 45, wherein each discrete  
2        illumination intensity level mapping function is a linear illumination intensity level mapping  
3        function.

1        50. (Previously Presented) The method as claimed in claim 48, wherein the plurality of  
2        discrete linear illumination intensity level mapping functions form a composite piece-wise linear  
3        illumination intensity level mapping function, the composite piece-wise linear compression  
4        being the determined illumination intensity level mapping function, the determined illumination  
5        intensity level mapping function being a nearly logarithmic illumination intensity level mapping  
6        function.

1        51. (Previously Presented) The method as claimed in claim 49, wherein the eight discrete  
2        linear illumination intensity level mapping functions form a composite piece-wise linear  
3        illumination intensity level mapping function, the composite piece-wise linear compression  
4        being the determined illumination intensity level mapping function, the determined illumination  
5        intensity level mapping function being a nearly logarithmic illumination intensity level mapping  
6        function.

1        52. (Previously Presented) A method of adaptively controlling sensitivity, on a pixel-by-  
2        pixel basis, of a digital imager, comprising:

- 3              (a) selecting a first illumination intensity level mapping function;
- 4              (b) determining a first transfer control function based on the selected first compression;
- 5              (c) imposing the determined first transfer control function upon a pixel of the digital  
6        imager;
- 7              (d) determining a histogram of illumination intensity levels of pixels of image data being  
8        generated by the digital imager having the determined first transfer control function imposed  
9        thereon;

10           (e) determining an illumination intensity level maximum, the illumination intensity level  
11 maximum representing a greatest illumination intensity level for a pixel in a sample forming the  
12 histogram;

13           (f) determining a second illumination intensity level mapping function, based on the  
14 determined intensity level maximum, the second illumination intensity level mapping function  
15 preventing the generation of any saturated pixels and providing a dynamic range of image data  
16 enabling each level in the histogram to be realized by the digital imager;

17           (g) determining a second transfer control function based on the determined second  
18 illumination intensity level mapping function; and

19           (h) imposing the determined second transfer control function upon a pixel of the digital  
20 imager.

1           53. (Previously Presented) The method as claimed in claim 52, wherein the first  
2 illumination intensity level mapping function represents a greater compression of the resolution  
3 of the high illumination intensity levels of the scene than the second illumination intensity level  
4 mapping function.

1           **Claims 54-58 (Cancelled)**

1           59. (Original) A system for adaptively controlling sensitivity, on a pixel-by-pixel basis,  
2 of a digital imager, comprising:

3           an illumination intensity level mapping controller, operatively connected to the digital  
4 imager, to determine a number of pixels of image data having illumination intensity levels within  
5 a first defined range of illumination intensity levels and to determine an illumination intensity  
6 level mapping function based upon the determined number of pixels within the first defined  
7 range of illumination intensity levels; and

8           a transfer control function generation circuit, operatively connected to the digital imager  
9 and said illumination intensity level mapping controller, to determine a transfer control function  
10 based on the determined illumination intensity level mapping function and to impose the  
11 determined transfer control function upon a pixel of the digital imager.

1        60. (Original) The system as claimed in claim 59, further comprising:

2              an exposure controller, operatively connected to the digital imager and said transfer  
3 control function generation circuit, to determine a number of pixels having illumination intensity  
4 levels within a second defined range of illumination intensity levels and to determine an  
5 integration time based upon the determined number of pixels having illumination intensity levels  
6 within a second defined range of illumination intensity levels;

7              said transfer control function generation circuit determining said transfer control function  
8 based on the determined illumination intensity level mapping function and the determined  
9 integration time.

1        61. (Original) The system as claimed in claim 59, wherein the first defined range of  
2 illumination intensity levels is a range of illumination intensity levels including an illumination  
3 intensity level representing pixel saturation.

1        62. (Original) The system as claimed in claim 60, wherein the second defined range of  
2 illumination intensity levels is a range of illumination intensity levels including an illumination  
3 intensity level representing a minimum illumination intensity level.

1        63. (Original) The system as claimed in claim 60, wherein the first defined range of  
2 illumination intensity levels is a range of illumination intensity levels including an illumination  
3 intensity level representing pixel saturation and the second defined range of illumination  
4 intensity levels is a range of illumination intensity levels including an illumination intensity level  
5 representing a minimum illumination intensity level adjusted for a pixel offset value.

1        64. (Original) The system as claimed in claim 59, wherein said illumination intensity  
2 level mapping controller determines a number of pixels of image data having illumination  
3 intensity levels within a first defined range of illumination intensity levels from a frame of pixels  
4 of image data created by the digital imager.

1        65. (Original) The system as claimed in claim 59, wherein said illumination intensity  
2 level mapping controller determines a number of pixels of image data having illumination  
3 intensity levels within a first defined range of illumination intensity levels from a partial frame of  
4 pixels of image data created by the digital imager.

1        66. (Original) The system as claimed in claim 59, wherein said illumination intensity  
2 level mapping controller determines a number of pixels of image data having illumination  
3 intensity levels within a first defined range of illumination intensity levels from a defined area  
4 within a frame of pixels of image data created by the digital imager.

1        67. (Original) The system as claimed in claim 59, wherein said illumination intensity  
2 level mapping controller determines a number of pixels of image data having illumination  
3 intensity levels within a first defined range of illumination intensity levels from a user-defined  
4 area within a frame of pixels of image data created by the digital imager.

1        68. (Original) The system as claimed in claim 59, wherein the determined illumination  
2 intensity level mapping function is a calculated illumination intensity level mapping function, the  
3 calculation being based upon the determined number of pixels within the first defined range of  
4 illumination intensity levels.

1        69. (Original) The system as claimed in claim 59, wherein the determined illumination  
2 intensity level mapping function is a selected illumination intensity level mapping function  
3 selected from a plurality of pre-specified illumination intensity level mapping functions, the  
4 selection being based upon the determined number of pixels within the first defined range of  
5 illumination intensity levels.

1        70. (Original) The system as claimed in claim 59, wherein the determined transfer control  
2 function is a calculated transfer control function, the calculation being based upon the  
3 determined illumination intensity level mapping function.

1        71. (Original) The system as claimed in claim 59, wherein the determined transfer control  
2 function is a selected transfer control function from a plurality of pre-specified transfer control  
3 functions, the selection being based upon the determined illumination intensity level mapping  
4 function.

1        72. (Original) The system as claimed in claim 60, wherein the determined transfer control  
2 function is a calculated transfer control function, the calculation being based upon the  
3 determined illumination intensity level mapping function and determined integration time.

1        73. (Original) The system as claimed in claim 60, wherein the determined transfer control  
2 function is a selected transfer control function from a plurality of pre-specified transfer control  
3 functions, the selection being based upon the determined illumination intensity level mapping  
4 function and determined integration time.

1        74. (Currently Amended) A system for adaptively controlling sensitivity, on a pixel-by-  
2 pixel basis, of a digital imager, comprising:

3            an illumination intensity level mapping controller, operatively connected to the digital  
4 imager, to determine a number of pixels of image data having illumination intensity levels within  
5 a first defined range of illumination intensity levels and to determine an illumination intensity  
6 level mapping function based upon the determined number of pixels within the first defined  
7 range of illumination intensity levels; and

8            a transfer control function generation circuit, operatively connected to the digital imager  
9 and said illumination intensity level mapping controller, to determine a transfer control function  
10 based on the determined illumination intensity level mapping function and to impose the  
11 determined transfer control function upon a pixel of the digital imager; The system as claimed in  
12 claim 59, wherein

13          said illumination intensity level mapping controller determines a number of pixels of  
14 image data having illumination intensity levels within a first defined range of illumination  
15 intensity levels during a period of time that the digital imager is creating a second frame of  
16 pixels;

17        said illumination intensity level mapping controller determines the illumination intensity  
18    level mapping function based upon the determined number of pixels of image data having  
19    illumination intensity levels within a first defined range of illumination intensity levels during  
20    the period of time that the digital imager is creating the second frame of pixels; and

21        said transfer control function generation circuit imposes the determined transfer control  
22    function upon a pixel of the digital imager during a third frame of pixels of image data being  
23    created by the digital imager.

1            75. (Currently Amended) A system for adaptively controlling sensitivity, on a pixel-by-  
2    pixel basis, of a digital imager, comprising:

3            an illumination intensity level mapping controller, operatively connected to the digital  
4    imager, to determine a number of pixels of image data having illumination intensity levels within  
5    a first defined range of illumination intensity levels and to determine an illumination intensity  
6    level mapping function based upon the determined number of pixels within the first defined  
7    range of illumination intensity levels; and

8            a transfer control function generation circuit, operatively connected to the digital imager  
9    and said illumination intensity level mapping controller, to determine a transfer control function  
10   based on the determined illumination intensity level mapping function and to impose the  
11   determined transfer control function upon a pixel of the digital imager; The system as claimed in  
12   claim 59, wherein

13        said illumination intensity level mapping controller determines a number of pixels of  
14    image data having illumination intensity levels within a first defined range of illumination  
15    intensity levels during a period of time that the digital imager is creating a first frame of pixels;

16        said illumination intensity level mapping controller determines the illumination intensity  
17    level mapping function based upon the determined number of pixels of image data having  
18    intensity levels within a first defined range of intensity levels during the period of time that the  
19    digital imager is creating the first frame of pixels; and

20        said transfer control function generation circuit imposes the determined transfer control  
21    function upon a pixel of the digital imager during a second frame of pixels of image data being  
22    created by the digital imager.

1        76. (Original) The system as claimed in claim 60, wherein the illumination intensity level  
2 mapping function is determined independently of the determination of the integration time.

1        77. (Original) The system as claimed in claim 60, wherein the determinations of the  
2 illumination intensity level mapping function and integration time are dependent thereupon.

1        78. (Original) The system as claimed in claim 60, wherein the illumination intensity level  
2 mapping function is determined prior to the determination of the integration time.

1        79. (Original) The system as claimed in claim 60, wherein the illumination intensity level  
2 mapping function is determined after the determination of the integration time.

1        80. (Original) The system as claimed in claim 60, wherein determinations of the  
2 illumination intensity level mapping function and the integration time are determined  
3 substantially simultaneously.

1        81. (Original) The system as claimed in claim 59, wherein said illumination intensity  
2 level mapping controller determines, for each of a plurality of defined ranges of illumination  
3 intensity levels, a number of pixels within the defined range of illumination intensity levels when  
4 the determined number of pixels within the first defined range of illumination intensity levels is  
5 above a first threshold;

6              said illumination intensity level mapping controller determines, for each defined range of  
7 illumination intensity levels, an illumination intensity level mapping function based upon the  
8 determined number of pixels within the defined ranges of illumination intensity levels.

1        82. (Original) A system for adaptively controlling sensitivity, on a pixel-by-pixel basis,  
2 of a digital imager, comprising:

3              an illumination intensity level mapping controller, operatively connected to the digital  
4 imager, to determine a plurality of number of pixels, each determined number of pixels being a  
5 number of pixels within an associated defined range of illumination intensity levels and to  
6 determine a plurality of illumination intensity level mapping functions, each determined

7       illumination intensity level mapping function corresponding to one defined range of illumination  
8       intensity levels, each illumination intensity level mapping function being determined based upon  
9       the determined number of pixels within an associated defined range of illumination intensity  
10      levels; and

11            a transfer control function generation circuit, operatively connected to the digital imager  
12       and said illumination intensity level mapping controller, to determine a transfer control function  
13       based on the plurality of determined illumination intensity level mapping functions and to  
14       impose the determined transfer control function upon a pixel of the digital imager.

1           83. (Original) The system as claimed in claim 82, further comprising:

2           an exposure controller, operatively connected to the digital imager and said transfer  
3       control function generation circuit, to determine a number of pixels having illumination intensity  
4       levels within a specified range of illumination intensity levels and to determine an integration  
5       time based upon the determined number of pixels having illumination intensity levels within a  
6       specified range of illumination intensity levels;

7           said transfer control function generation circuit determining said transfer control function  
8       based on the plurality of determined illumination intensity level mapping functions and the  
9       determined integration time.

1           84. (Original) The system as claimed in claim 83, wherein the specified range of  
2       illumination intensity levels is a range of illumination intensity levels including an illumination  
3       intensity level representing a minimum illumination intensity level.

1           85. (Original) The system as claimed in claim 83, wherein the specified range of  
2       illumination intensity levels is a range of illumination intensity levels including an illumination  
3       intensity level representing a minimum illumination intensity level adjusted for a pixel offset  
4       value.

1           86. (Original) The system as claimed in claim 82, wherein said illumination intensity  
2       level mapping controller determines each number of pixels corresponding to one defined range

3 of illumination intensity levels from a frame of pixels of image data created by the digital  
4 imager.

1 87. (Original) The system as claimed in claim 82, wherein said illumination intensity  
2 level mapping controller determines each number of pixels corresponding to one defined range  
3 of illumination intensity levels from a partial frame of pixels of image data created by the digital  
4 imager.

1 88. (Original) The system as claimed in claim 82, wherein said illumination intensity  
2 level mapping controller determines each number of pixels corresponding to one defined range  
3 of illumination intensity levels from a defined area within a frame of pixels of image data created  
4 by the digital imager.

1 89. (Original) The system as claimed in claim 82, wherein said illumination intensity  
2 level mapping controller determines each number of pixels corresponding to one defined range  
3 of illumination intensity levels from a user-defined area within a frame of pixels of image data  
4 created by the digital imager.

1 90. (Currently Amended) A system for adaptively controlling sensitivity, on a pixel-by-  
2 pixel basis, of a digital imager, comprising:

3 an illumination intensity level mapping controller, operatively connected to the digital  
4 imager, to determine a plurality of number of pixels, each determined number of pixels being a  
5 number of pixels within an associated defined range of illumination intensity levels and to  
6 determine a plurality of illumination intensity level mapping functions, each determined  
7 illumination intensity level mapping function corresponding to one defined range of illumination  
8 intensity levels, each illumination intensity level mapping function being determined based upon  
9 the determined number of pixels within an associated defined range of illumination intensity  
10 levels; and

11 a transfer control function generation circuit, operatively connected to the digital imager  
12 and said illumination intensity level mapping controller, to determine a transfer control function  
13 based on the plurality of determined illumination intensity level mapping functions and to

14 impose the determined transfer control function upon a pixel of the digital imager; The system as  
15 claimed in claim 82, wherein

16       said illumination intensity level mapping controller determines each number of pixels  
17       corresponding to one defined range of illumination intensity levels during a period of time that  
18       the digital imager is creating a second frame of pixels;

19       said illumination intensity level mapping controller determines each illumination  
20       intensity level mapping function corresponding to one of the defined ranges of illumination  
21       intensity levels during the period of time that the digital imager is creating the second frame of  
22       pixels; and

23       said transfer control function generation circuit imposes the determined transfer control  
24       function upon a pixel of the digital imager during a third frame of pixels of image data created by  
25       the digital imager.

1       91. (Currently Amended) A system for adaptively controlling sensitivity, on a pixel-by-  
2 pixel basis, of a digital imager, comprising:

3       an illumination intensity level mapping controller, operatively connected to the digital  
4 imager, to determine a plurality of number of pixels, each determined number of pixels being a  
5 number of pixels within an associated defined range of illumination intensity levels and to  
6 determine a plurality of illumination intensity level mapping functions, each determined  
7 illumination intensity level mapping function corresponding to one defined range of illumination  
8 intensity levels, each illumination intensity level mapping function being determined based upon  
9 the determined number of pixels within an associated defined range of illumination intensity  
10 levels; and

11       a transfer control function generation circuit, operatively connected to the digital imager  
12 and said illumination intensity level mapping controller, to determine a transfer control function  
13 based on the plurality of determined illumination intensity level mapping functions and to  
14 impose the determined transfer control function upon a pixel of the digital imager; The system as  
15 claimed in claim 82, wherein

16       said illumination intensity level mapping controller determines each number of pixels  
17       corresponding to one defined range of illumination intensity levels during a period of time that  
18       the digital imager is creating a first frame of pixels;

19        said illumination intensity level mapping controller determines each illumination  
20      intensity level mapping function corresponding to one of the defined ranges of illumination  
21      intensity levels during the period of time that the digital imager is creating the first frame of  
22      pixels; and

23        said transfer control function generation circuit imposes the determined transfer control  
24      function upon a pixel of the digital imager during a second frame of pixels of image data created  
25      by the digital imager.

1            92. (Previously Presented) A system for adaptively controlling sensitivity, on a pixel-by-  
2      pixel basis, of a digital imager, comprising:

3            an illumination intensity level mapping controller, operatively connected to the digital  
4      imager, to determine a number of saturated pixels and to select a first illumination intensity level  
5      mapping function when the determined number of saturated pixels is above a first threshold;

6            said illumination intensity level mapping controller determining an number of pixels  
7      having illumination intensity levels within a defined range of values and selecting a second  
8      illumination intensity level mapping function when the determined number of pixels is below a  
9      second threshold; and

10          a transfer control function generation circuit, operatively connected to the digital imager  
11      and said illumination intensity level mapping controller, to determine a transfer control function  
12      based on the selected illumination intensity level mapping function and to impose the determined  
13      transfer control function upon a pixel of the digital imager.

1            93. (Previously Presented) The system as claimed in claim 92, wherein the first  
2      illumination intensity level mapping function represents a greater compression of the resolution  
3      of the high illumination intensity levels of the scene than the second illumination intensity level  
4      mapping function.

1            94. (Previously Presented) The system as claimed in claim 92, wherein said illumination  
2      intensity level mapping controller determines the number of pixels when the determined number  
3      of saturated pixels is below a first threshold.

1        95. (Previously Presented) The system as claimed in claim 92, further comprising:  
2              an exposure controller, operatively connected to the digital imager and said transfer  
3              control function generation circuit, to determine a number of pixels having illumination intensity  
4              levels within a specified range of illumination intensity levels and to determine an integration  
5              time based upon the determined number of pixels having illumination intensity levels within a  
6              specified range of illumination intensity levels;

7              said transfer control function generation circuit determining the transfer control function  
8              based on the selected illumination intensity level mapping function and the determined  
9              integration time.

1        96. (Original) A system for adaptively controlling sensitivity, on a pixel-by-pixel basis,  
2        of a digital imager, comprising:

3              an illumination intensity level mapping controller, operatively connected to the digital  
4              imager, to determine a number of pixels of image data having illumination intensity levels within  
5              a first defined range of illumination intensity levels, the first defined range of illumination  
6              intensity levels including an illumination intensity level corresponding to a pixel saturation  
7              value, and to determine an illumination intensity level mapping function based upon the  
8              determined number of pixels within the first defined range of illumination intensity levels;

9              an exposure controller, operatively connected to the digital imager, to determine a  
10          number of pixels having illumination intensity levels within a second defined range of  
11          illumination intensity levels, the second defined range of illumination intensity levels including  
12          an illumination intensity level corresponding to a minimum illumination intensity level, and to  
13          determine an integration time based upon the determined number of pixels having illumination  
14          intensity levels within the second defined range of illumination intensity levels; and

15              a transfer control function generation circuit, operatively connected to the digital imager,  
16        said exposure controller and said illumination intensity level mapping controller, to determine a  
17        transfer control function based on the determined illumination intensity level mapping function  
18        and the determined integration time and to impose the determined transfer control function upon  
19        a pixel of the digital imager.

1        97. (Original) The system as claimed in claim 96, wherein the transfer control function  
2        comprises a plurality of discrete transfer control functions.

1        98. (Original) The system as claimed in claim 96, wherein the transfer control function  
2        comprises eight discrete transfer control functions.

1        99. (Original) The system as claimed in claim 97, wherein the determined illumination  
2        intensity level mapping function comprises a plurality of discrete illumination intensity level  
3        mapping functions.

1        100. (Original) The system as claimed in claim 98, wherein the determined illumination  
2        intensity level mapping function comprises eight discrete illumination intensity level mapping  
3        functions.

1        101. (Original) The system as claimed in claim 99, wherein each discrete transfer control  
2        function is determined based on one of the plurality of distinct illumination intensity level  
3        mapping functions.

1        102. (Original) The system as claimed in claim 100, wherein each discrete transfer  
2        control function is determined based on one of the eight distinct illumination intensity level  
3        mapping functions.

1        103. (Original) The system as claimed in claim 99, wherein each discrete illumination  
2        intensity level mapping function is a linear illumination intensity level mapping function.

1        104. (Original) The system as claimed in claim 100, wherein each discrete illumination  
2        intensity level mapping function is a linear illumination intensity level mapping function.

1        105. (Original) The system as claimed in claim 103, wherein the plurality of discrete  
2        linear illumination intensity level mapping functions form a composite piece-wise linear  
3        illumination intensity level mapping function, the composite piece-wise linear compression

4 being the determined illumination intensity level mapping function, the determined illumination  
5 intensity level mapping function being a nearly logarithmic illumination intensity level mapping  
6 function.

1 106. (Original) The system as claimed in claim 104, wherein the eight discrete linear  
2 illumination intensity level mapping functions form a composite piece-wise linear illumination  
3 intensity level mapping function, the composite piece-wise linear compression being the  
4 determined illumination intensity level mapping function, the determined illumination intensity  
5 level mapping function being a nearly logarithmic illumination intensity level mapping function.

1 107. (Original) A system for adaptively controlling sensitivity, on a pixel-by-pixel basis,  
2 of a digital imager, comprising:

3 an illumination intensity level mapping controller, operatively connected to the digital  
4 imager, to select a first illumination intensity level mapping function; and

5 a transfer control function generation circuit, operatively connected to the digital imager  
6 and said illumination intensity level mapping controller, to determine a first transfer control  
7 function based on the selected first compression and to impose the determined first transfer  
8 control function upon a pixel of the digital imager;

9 said illumination intensity level mapping controller determining a histogram of  
10 illumination intensity levels of pixels of image data being generated by the digital imager having  
11 the determined first transfer control function imposed thereon;

12 said illumination intensity level mapping controller determining an illumination intensity  
13 level maximum, the illumination intensity level maximum representing a greatest illumination  
14 intensity level for a pixel in a sample forming the histogram;

15 said illumination intensity level mapping controller determining a second illumination  
16 intensity level mapping function, based on the determined intensity level maximum, the second  
17 illumination intensity level mapping function preventing the generation of any saturated pixels  
18 and providing a dynamic range of image data enabling each level in the histogram to be realized  
19 by the digital imager;

20 said transfer control function generation circuit determining a second transfer control  
21 function based on the determined second illumination intensity level mapping function;

22           said transfer control function generation circuit imposing the second determined transfer  
23       control function upon a pixel of the digital imager.

1           108. (Original) The system as claimed in claim 107, wherein the first illumination  
2       intensity level mapping function represents a greater compression of the resolution of the high  
3       illumination intensity levels of the scene than the second illumination intensity level mapping  
4       function.

1           **Claims 109-113 (Cancelled)**